

NAVAL SURFACE WARFARE CENTER,  
SUPERSONIC WIND TUNNEL BUILDING  
(Naval Surface Warfare Center,  
Buildings No. 11, 146, 168)  
Bounded to the south by Clara  
Barton Parkway and to the north and east  
by MacArthur Boulevard  
~~Bethesda vicinity~~ Silver Spring  
Montgomery County  
Maryland

HAER No. MD-118-C

HAER  
MD,  
16-SIL SPR,  
3C-

#### PHOTOGRAPHS

#### WRITTEN HISTORICAL AND DESCRIPTIVE DATA

#### HISTORIC AMERICAN ENGINEERING RECORD

National Park Service  
Northeast Region  
Philadelphia Support Office  
U.S. Custom House  
200 Chestnut Street  
Philadelphia, P.A. 19106

HISTORIC AMERICAN ENGINEERING RECORD

NAVAL SURFACE WARFARE CENTER, SUPERSONIC WIND TUNNEL BUILDING  
(Naval Surface Warfare Center, Buildings No. 11, 146, 168)

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Location: Bounded to the south by the Clara Barton Parkway and to the north and east by MacArthur Boulevard  
~~Bethesda~~ *Silver Spring*  
Montgomery County  
Maryland

USGS Falls Church, Virginia Quadrangle  
Universal Transverse Mercator Coordinates:  
18.309660.4316010

Date of Construction: 1943-1945

Engineer: Bureau of Yards and Docks, Navy Department  
Architect: Bureau of Yards and Docks, Navy Department

Present Owner: U.S. Department of the Navy  
Department of Defense

Present Use: Vacant

Significance: The Supersonic Wind Tunnel Building is an aviation testing facility contained within the Naval Surface Warfare Center (NSWC) Carderock Division Historic District. As the center for naval research, design, testing, and evaluation (RDT&E), NSWCCD played a critical role in the design and development of the modern navy. The research facilities at NSWCCD have provided the U.S. Navy with accurate cost effective data on air and sea vehicle performance, and have made possible evaluative changes to improve performance, in advance of construction.

Project Information: Under the 1995 round of Base Closure and Realignment (BRAC), research functions carried out at Naval Surface Warfare Center White Oak, Maryland will be relocated to Naval Surface Warfare Center Carderock Division. The Supersonic Wind Tunnel Building will be altered to accommodate these new functions. Documentation of these three buildings to the standards of the Historic American Engineering Record prior to alteration was prescribed as a stipulation of a Memorandum of Agreement negotiated among the Maryland State Historic Preservation Officer and the Department of the Navy, and accepted by the Advisory Council on Historic Preservation. This documentation was undertaken in June and July 1995 in partial fulfillment of that agreement.

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### Architectural Description

The Supersonic Wind Tunnel Building is a two-story, poured concrete building faced with stucco. The building has a rectangular plan, measuring approximately 115 by 43 feet, and rises to a height of approximately 36 feet.<sup>1</sup> The interior consists of a compressor room, two test rooms, and a divided office area located at the south end of the building.

The supersonic wind tunnel building rests on a concrete foundation; interior concrete load bearing walls and piers are found in the basement. The building terminates in a flat roof with parapet. The window units of this building are industrial sash, recessed from the exterior wall plane. Three supersonic wind tunnels were installed in one room of Building 11 and were connected to a common 32-foot metal vacuum sphere (Building 146) at the diffuser end of the wind tunnels. One of the supersonic wind tunnels, a 12 by 12 inch flexible plate tunnel, survives intact in Building 11.

Entries to Building 11 are located on the east elevation. The north end of the east elevation features a large overhead track metal door at ground level which leads to the compressor room. Two metal doors are located south of the overhead door. One door leads to the test room, while the other leads to the divided office area. The basement is accessed by an open underground service bay found on the south elevation. A small swing arm crane is located on the east side of the opening. A metal ladder located on the south end of the opening leads to a metal overhead door. The bay is surrounded by a metal railing.

The basement contains the heating system for the building as well as two small Fuller vacuum pumps, which were used while the spheres were being evacuated.

The interior of the first floor is divided into three open bays and one divided office space. All of the rooms are connected by interior doorways. The northernmost room houses two Chicago Pneumatic Simplate Valve Vacuum Pumps, Model No. 40899 and two Chicago Pneumatic Simplate Valve Air Compressors, Model No. 40898. These machines assisted in the evacuations of the Vacuum Spheres (Buildings 146 and 168). Once the air from spheres was evacuated, the air was exhausted into the atmosphere at the rear of Building 11.

Two open test rooms, which contained the supersonic wind tunnels, are found south of the compressor rooms. The northernmost room is vacant, while the south room includes the extant wind tunnel, a 12 by 12 inch variable flexible plate supersonic unit. The flexible plate of the tunnel allowed tests within a range of Mach numbers from 1.2 to 4.5.

Unlike the Subsonic and Transonic Wind Tunnels, the Supersonic Wind Tunnel is of the intermittent blow down type. Rather than a closed unit, the supersonic wind tunnels utilize a supply of stored air that is exhausted into the vacuum spheres. Before a test, the sphere was emptied by a Chicago Pneumatic air pump. A small valve was then opened and air rushed through the test chamber and into the sphere at great

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<sup>1</sup> Supersonic Wind Tunnel Building, Ground Floor Plan, Bureau of Yards and Docks, 17 October 1947.

speed. In order to vary the Mach number, the throat of the test chamber was adjusted. The narrower the throat, the higher the mach number. Operation times are limited by the sphere volume and pumping capacity.<sup>2</sup>

The southern end of Building 11, which is a later addition, is designed in a double loaded corridor plan on the first floor and divided office space on the second floor. The offices of both floors are vacant. Each space incorporates drop ceilings and fluorescent lighting units.

Two vacuum pumps (Buildings 146 and 168) are located to the west of Building 11 at the diffuser end of the wind tunnel. Building 146 is a 32-foot metal vacuum sphere supported by five metal posts on a poured concrete foundation. Crossed metal tie-rods reinforce the supports. A metal ladder extends up the east side of the sphere. Building 168, was the second vacuum sphere to be constructed at the installation. This 38-foot metal vacuum sphere is supported by six metal poles on a poured concrete foundation. The combined operation of the sphere resulted in a total volume of over 45,000 cubic feet. This additional capacity increased the maximum running time of the three supersonic wind tunnels housed in Building 11.

### History

Soon after the construction of the Subsonic wind tunnels, the invention of the jet engine greatly increased the operational speeds of aircraft, and more advanced testing facilities were needed to solve questions resulting from this increased performance. Funds for the construction of a Supersonic Wind Tunnel Building at Carderock to house two small existing supersonic blown-down type wind tunnels located in Kochel, Germany as well as a larger, 18 x 18 inch supersonic wind tunnel were approved in 1946 and construction was completed in 1948 at a cost of \$2,372,689.

The three tunnels were installed in one room of the building and were connected to the 32 foot vacuum sphere (Building 146). Testing began at the facility in September 1950, however run times were limited by sphere volume and pumping capacity. In 1957, a request for increased running times and a Hypersonic wind tunnel brought about a building expansion and the installation of new equipment. A two-story addition to Building 11 was constructed at the southern end of the building. The addition has a rectangular plan, measuring approximately 33 by 43 feet, and rises to a height of approximately 36 feet.<sup>3</sup> A 38 foot vacuum sphere (Building 168) was coupled to the existing sphere. The addition of the second vacuum sphere, nearly tripled the length of time available for tests.

HAER recordation of the Supersonic Wind Tunnel Building was undertaken in anticipation of its adaptive reuse for new activities moving to the installation as a result of the 1995 Base Realignment and Closure Act. Building 11 is slated for renovation as office space. Buildings 146 and 168 are slated for demolition in 1996.

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<sup>2</sup> John Washko, personal interview, 17 June 1996.

<sup>3</sup> Supersonic Wind Tunnel Building, Addition, Arde Associates, 17 July 1957.

## SOURCE OF INFORMATION/BIBLIOGRAPHY

### A. Engineering Drawings:

Drawings in the collection Naval Surface Warfare Center Carderock Division, Bethesda, Maryland:

1947, October 27. Supersonic Wind Tunnel, Steel Vacuum Sphere; Foundation Plan, Elevation, and Details. Three sheets. Bureau of Yards and Docks.

1947, October 17. Supersonic Wind Tunnel Building, Sections and Details. Twenty sheets. Bureau of Yards and Docks.

1947, October 17. Supersonic Wind Tunnel Building, Ground Floor Plan. Twenty sheets. Bureau of Yards and Docks.

1957, July 12. 38 foot Vacuum Sphere, General Plan. Five sheets. Chicago Bridge and Iron Company, Chicago, Ill.

1957, July 17. Supersonic Wind Tunnel Building, Addition. One Sheet. Arde Associates, Newark, NJ.

### B. Historic Views (All historic views courtesy of Naval Surface Warfare Center Carderock Division, Bethesda, Maryland):

View south of Supersonic Wind Tunnel Test Section, ca. 1960.

### C. Interviews:

Washko, John (Supervisor Mechanical Engineer Technician). Interview by Geoffrey E. Melhulsh, 17 June 1996. Transcript, Naval Surface Warfare Center Carderock Division, Bethesda, Maryland.